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CHEMICALS

EXPERTS VIEW METHANOL AS POSSIBLE REPLACEMENT FOR NAPHTHA

Paris L'USINE NOUVELLE in French Oct 80 pp 7-8

[Article by Claude Goudier]

> [Text] As return to the carbon chemistry of yesteryear is out of the question, there is a trun more and more to methanol, extracted either from natural gas or coal, which someday could well replace naptha.

Confronted with the climb in oil prices and threatened with shortage, many industrialists are thinking seriously about a large-scale return to coal, especially in the chemical field, where coal is both a source of energy for production of steam, and a source of carbon for processes of chemical synthesis.

However, it is quite impossible to think of returning to the good old carbon chemistry of the Thirties. In the big "farsighted" groups, they are working actively on methanol chemistry, to obtain the substance from gasification of coal.

Methanol, as the fourth biggest product of organic chemistry--after ethylene, propylene, and the aromatics--is an important medium, produced on a massive scale for almost the last 80 years, and its most important end products are, schematically, forsol, solvents, and acetic acid. For some years, however, the use of methanol has broadened, and today with this product one can obtain, as with naptha, olefins--which are a base for plastic substances, fibers, paints, etc.

So far there has been no industrial application, only pilot projects that are on the verge of success here and there. The most significant success so far is probably that of the American company Mobil Oil in transforming coalbased methanol into automobile fuel. In other respects this type of initiative is the doing of oil-poor European chemists, as DuPont de Nemours--explains Richard E. Heckert, its vice-president--is betting heavily on methanol for a large part of its production, especially in polyester fibers.

For Professor Horst Pommer, director of research at BASF [expansion unknown], it is a sure bet that coal can do everything that can be done by oil and natural gas, but at higher cost. Its small hydrogen content is its biggest liability in chemical and energy terms, whether we speak of liquefaction or gasification. "Though the latter method is closer to profitability than liquefaction, we are not participating in any research on this subject," Horst Pommer took pains to emphasize. We prefer to work on the transformation of methanol coming from synthetic gases in chemical

products such as olefins. We also have an experimental installation which started up this year and which can transform up to 30 tons of methanol a month into ethylene and propylene."

For his part, Professor Karl Heinz Buchel, director research at Bayer, is speaking almost the same language, with however a bit more reserve. He thinks that methanol chemistry will result in concrete applications after 1990. However, he does not think that methanol will be manufactured out of coal. One can in fact obtain it, as is done presently, starting with natural gas, biomass, and also oil-bearing sand or bituminous shale.

Natural Gas Will Serve as a Stage

Professor Buchel considers that there will still be enough natural gas for many years to satisfy the need for methanol. And he adds, with measured optimism, that the chemists don't need so much to worry about running short, as their needs ultimately represent only 6 to 7 percent of overall oil consumption. "Let's burn coal in our boilers instead of oil," he says, "and keep the oil for our steam cracker." Who would not hesitate before the enormous investments that would be required by a gasification plant? Beyond the Rhine, it is estimated that one medium-size unit treating 1.5 million tons of coal per year would cost 1.1 billion DM! This is a lot.

Meanwhile, Bayer is continuing, like BASF and the English ICI, its work on methanol, which is already being called the oil of tomorrow. In the process of this change-over, one can think of natural gas as serving as a stage in reconversion, leading toward gasification of coal. The proof of it is that everywhere in the world one finds, now and again, that where there are deposits of natural gas there are plans for hug methanol installations.

But one must not forget that in all probability the price of natural gas is going to aline itself with the price of oil, and will thus add to some net costs. One cannot help asking if perhaps the big chemical firms should not, under these conditions, look more closely into the possibilities in this new carbon chemistry. Taking into account the long lead-times for getting into production, time is running out.

9516
CSO: 3102

FIRST EUROPEAN SOLAR POWER PLANT TO OPERATE BY LATE 1980

Frankfurt/Main ELEKTRIZITAETSWIRTSCHAFT in German 1 Sep 80 p 672

[Text] Probably by the end of 1980 Eurelios, the first European solar power station will begin experimental operation in Sicily, in the vicinity of Catania. The 1 MW solar thermal electrical generating plant is a project of the EEC. During the initial test phase information will be collected concerning the technical suitability of the plant, which is later to feed current into the public grid. The technical layout of this plant, which is based on the tower concept, was one of the important pieces of information at the third International Solar Forum in Hamburg (24 to 27 June 1980). The meeting, which is under the patronage of Chancellor Helmut Schmidt, was sponsored this year equally by the five organizations which are preparing the application of technologies to use solar energy in the FRG. They are the Association for Solar Energy, in Essen, the German section of the Cooperation Mediterraneenne Pour L'Energie Solaire, Loerrach, the German Society for Solar Energy, Munich, the German section of the International Society for Solar Energy, Duesseldorf, and the Committee of Experts on Solar Energy of the Association of German Engineers in Duesseldorf. The program was divided into several areas: in lectures of general interest competent speakers from politics, the economy and science explained their position on the application of energy-saving technologies and the possibilities of using renewable energy sources; in a seminar held by the Ministry for Technology and Research (BMFT) experts described the current state of research in wind and solar energy. Experts from all over the world presented papers in open lectures in special research plans. The exhibition Solar Technology '80 on the Hamburg exhibition grounds was held in conjunction with the Solar Forum, which was attended by more than 1,400 experts from 35 countries. About 11,000 visitors found information about all aspects of solar technology in an exhibition area covering about 7,500 m^2. Solar collectors, which have been greatly improved of late, and various systems for extracting solar energy from air, water and the ground, from biomass and other natural storage systems were the center of interest here. Naturally the different kinds of heat pumps were in evidence without which solar energy can hardly be used in these latitudes. The technical refinement of a number of systems was remarkable.

In their research and development program on the use of solar energy the EEC Commission decided in 1975 to build a solar thermal power station with a relatively high output. Comparisons of the most varied types of power station had shown that for outputs of about 1 MW and up the tower concept (in which a central receiver is irradiated by numerous heliostats) is the best solution. Plants based on the

solar farm concept are unsuitable in this output range because of economic considerations. As the result of a systems definition study carried out immediately afterward construction of the 1-MW power station Eurelios was begun in Adrano near Catania in Sicily.

Assembly work has now been almost completed. When experimental operation begins, Eurelios will be the first tower generating station in the world oriented to practical use.

The solar thermal plant is being built by an industrial consortium consisting of the firms Ansaldo and Enel (Genoa, Rome) Cethel (Paris) and MBB [Messerschmitt-Boelkow-Blohm] (Munich). Under an advisory agreement the EEC is being assisted by a British company to supervise the project. The EEC is also financing 50 percent of the project, the other half of the costs is being borne by the FRG, France and Italy. The BMFT has subsidized the German share.

The main elements of the Eurelios tower generating station are the heliostat field (using two different types), the receiver and tower, the energy conversion system (consisting of steam circulation and the electrical generating plant) and the heat storage system. The heliostats reflect the incoming direct sunlight to the receiver mounted on the central tower. Water is pumped through the irradiation receiver, is heated up, vaporizes and drives a turbine which is hooked up to a generator. With thermal storage plant operation can be maintained for a short time even without the sun. Considering optical losses in the heliostat field, the efficiency of the receiver and the circulation of steam and the energy consumption of the plant, total efficiency is about 16 percent.

The heliostat field in Sicily has a total mirror area of about 6,216 m^2. The western half is equipped with 70 Cethel heliostats, the eastern half has 112 heliostats developed by MBB. As reflecting elements, heliostats have the ability to focus. To do this the mirror elements are curved.

In the Cethel heliostats the curvature is in only one direction (cylindrical), in the MBB type a two-dimensional curvature (spherical) is employed. In the course of final adjustment the individual mirrors of the heliostats are tilted so that the reflections from each individual element coincide. An electrical tracking system controls the orientation of the heliostats with the help of a microprocessor so that the necessary angular adjustments can be set up with a deviation of about 2.5 minutes of arc. The behavior of both types of heliostat will be studied during operation. The same possibilities for experimentation and work exist because the geometric relationships for the western half are the same in the morning as those for the eastern half in the afternoon.

The use of the chamber-type receiver, developed in Italy, with operating temperatures of just over 500° C and water/steam as the heat transporter and operating medium permits a relatively simple energy conversion system through the direct use of available components for steam circulation. The water and/or steam is taken through the receiver in two parallel pipes.

The preheating zone is in the center and is directly exposed to the incoming radiation. Vaporization takes place in the tube wall region, while the superheater

zone is in the rear part of the receiver and is thus protected against direct sunlight. Mineral wool insulation prevents heat loss through the wall of the receiver which is mounted at a height of 55 m on a steel lattice mast.

In order to be able to run the power station for about half an hour without the sun's radiation, thermal storage is provided. This consists of a tank for water under pressure and two storage tanks with molten salt, made up of a mixture of 53 percent KNO_3, 40 percent $NaNO_2$ and 7 percent $NaNO_3$. After steam has been taken from the pressure water storage tank the saturated steam is superheated by the heat in the salt, making problem-free turbine operation possible. The salt has a melting point of 145° C and is solid under normal conditions.

It will be the function of the electrical system of Eurelios to convert mechanical to electrical energy, to prepare suitable voltages for internal and external consumers through transformers, to link the plant to the public grid and to come up with possible controls for distribution of the current. Most of these tasks are regarded as conventional. On the other hand the control systems that are required to take into account variations in solar irradiation are new. The consequences for the running of the plant and feeding into the grid are to be studied closely during the operational test phase.

9581
CSO: 3102

ENERGY

CHEMICAL STORAGE MEDIUM FOR SOLAR HEAT FOUND

West Berlin DER TAGESSPIEGEL in German 1 Nov 80 p 15

[Article by Wulf Petzoldt: "Solar Heat Captured Forever"]

[Text] The result is astounding: one of the granules in the left-hand test tube dissolves on the tongue in a moment, like a crumb from a Eucharist wafer; it tastes a little like sand. A similar granule from the tube on the right also dissolves in a flash, but for a fraction of a second there is a burning sensation on the tongue. The professor smiles: "That is all that we have discovered." In reality the physics department of the University of Munich had succeeded in a truly spectacular project: solar energy was being stored for later use. For every house, for every type of heating, a hot summer can be saved for the winter--very simply and quite inexpensively.

For this discovery--"chemical heat storage of solar energy"--Professor Sizmann and his two traduate physicists Dieter Jung and Noureddine Khelifa from Tunisia were among the first three among 271 participants in a national research competition. The competition is now being held on the international level, sponsored by the BP Company, but run by independent juries. Professor Sizmann said: "In the first round we said to ourselves, it's just a game, we'll play along for fun, that's true now." Their chances, however, are not bad.

Use Narrowly Limited

What is this about? Everyone is talking about solar energy as an alternative to coal, oil, gas and nuclear power, but its use is narrowly limited. This is because of a perfectly natural problem. Solar irradiation is used least for heating when it is at its strongest, namely in the summer. That is to say: in July average irradiation is eight times stronger than in January. But in January eight times more heat production is needed than in July.

If solar energy is to be stored, giant hot water storage tanks with enormously thick layers of insulation are needed, at least that was the case until now. Sizmann explained: "The storage would have to be almost the size of a small lake, at least as large as the house being heated, quite apart from the cost." For this reason, house owners who already have solar collectors mostly switch back to gas or oil-heating in the winter. Collectors are far from adequate for

high-rise apartments even in summer. Even long-term latent heat storage would have to be half the size, its costs are similarly high and there are substantial technical obstacles.

The second problem is that solar collectors using current technology only give off low temperature heat, up to 60° Celsius. Generally, other sources of energy, natural gas, oil and coal, produce this type of heat for household heating and hot water.

For almost seven years Professor Sizmann thought about how to overcome this hurdle in solar energy and at the same time the increasing shortage of fossil energy sources. The solution lay in chemistry: there are several substances that split into two, three or more combinations as soon as they are heated--yet they retain their original structure. The separated combinations can be stored more or less for as long a time as desired. If the original base is wanted again, the partial combinations are mixed. Whether the process is quick or slow, they reconvert to the original substance and--this is critical--give off the heat which was used to divide them previously. The entire process requires no thermal insulation, and, depending on the original substance, ministorage is sufficient to stock the separated combinations.

For the Sizmann team the question of which substance was the most suitable was at the same time the question of which substance was in plentiful supply in the world and yet harmless to the environment. The "magic material" is zeolith, from the silicate family. It is totally nontoxic, crystalline aluminum oxide, it looks and tastes, as mentioned, like sand. Its availability is apparently immeasurable. There are rich deposits in Italy, Iceland, in the U.S., State of Wyoming, and also on the seabed. It is already being used in the chemicals industry, not to store energy but as a catalyst.

The Process Reversed

Professor Sizmann explained: "Our thinking was this, zeolith is charged with water. This water content can be removed by blowing warm or hot air, that is, dry air over it with a fan. The water is dissipated but the zeolith remains in its original form and it has stored the heat. If the entire process is reversed by blowing damp air over it, the zeolith absorbs the water again but gives up the stored heat in return."

In laboratory tests the Munich physicists discovered that this alternating process of storing and giving off heat can be repeated any number of times using zeolith and that the zeolith can be "heated up" with low solar effect, even in cloudy weather or in the winter. Naturally, the charging is quicker the more sun is available. For this reason, zeolith can be "charged up" somewhere other than at the place where it will be used. Sizmann again: "It could be done in Southern Italy and transported to us in Germany without any risk." This rule applies in the FRG: because the annual median solar irradiation is only slightly greater than the thermal requirements for heating, the zeolith storage would have to be charged for a year. The solution of heating it somewhere else is available wherever solar collectors can only be installed poorly or not at all, for instance

on highrise apartments or in heavily built up areas. The storage can be located anywhere, in the attic or in the basement. It can even be buried in the garden. The size for a single-family home is about 3 m^3. The more slowly the air passes over the zeolith to discharge it, the lower the amount of energy required to power it and the cheaper it is. In any case, the fan uses far, far less energy than can be obtained from storage. In laboratory tests Sizmann has achieved temperatures of around 100° Celsius from storage.

9581
CSO: 3102

GEOTHERMAL DRILLING PROGRESSES IN ALSACE

Paris SCIENCES ET AVENIR in French Sep 80 p 12

[Text] With the sinking of a 3,220-meter well in Cronenbourg, Alsace, the Alsatian Geothermal Mining Company (SOCALMIG) has just beaten the European depth record for a geothermal drilling.

The water, which reaches temperatures of 140°-150°C at a depth of over 3,000 meters, will be used to provide heat for dwellings and the Strasbourg CNRS [National Center for Scientific research] facilities. Arriving at the surface at about 130° at an output of 150 m^3 per hour, the water will pass through a heat exchanger to heat the water circulating in the distribution network. It will then be reinjected into the earth at about 60° C to maintain the underground pressure and resupply the reservoir. This reinjection well is to be drilled in the next few months. Starting at a point near the surface well, it will veer away at the bottom by about 1,500 meters so that the reinjected water will not cool the extracted water.

It is not very surprising that a geothermal record has been set in Alsace. In this region of France, the greatest geothermal pressures are to be found. These range from 3.5° to 10° C per 100 meters. What is more, thanks to previous oil drillings, much is known about the three principal reservoirs which make up the Dogger, Middle and Lower Triassic geological levels.

In the case of Cronenburg, the SOCALMIG based its drilling work on the test well at Meistratzheim, 20 km south of the city.

Cutting through 180 meters of clay and marl of the Upper Triassic level first, then 180 additional meters of calcareous limestone, the drill finally penetrated the sandstones of the Lower Triassic level. It is these sandstones which constitute the principal reservoir for the geothermy of Alsace. The water of this reservoir is always very hot--between 100° and 180° C--and the output is sizable. Cronenburg is a perfect example of Alsatian geothermy.

Another geothermal project is underway in the Paris region of Coulommiers. The drilling, which is being carried out under the direction of the BRGM [Bureau of Geological and Mining Exploration], reached the calcareous strata of the Dogger; and the water gushed forth at a temperature of 80°. A hospital complex and school buildings; i.e., the equivalent of 2,200 houses, will be heated in this manner, beginning in 1981. The economies realized every year is estimated at 340 equivalent tons of oil (TEP).

This operation is making a noteworthy contribution to the program set by the public authorities who estimate that geothermy will provide energy supplies on the order of 1 million TEP in 1990.

8143
CSO: 3102

BRIEFS

PHOTOVOLTAIC SOLAR PUMP--The largest solar pump in the world, which was constructed by the Guinard Pump Company, has just been placed in operation in Montpellier. This prototype, which cost 4 billion francs, uses photovoltaic cells and generates 26 kw which permits the irrigation by spraying of 8 hectares of land in a warm country [pays chaud]. [Text] [Paris SEMAINE DE L'ENERGIE in French 22 Sep 80 p 8] 8143

CSO: 3102

BMW'S LARGE-SCALE AUTOMATION, GOVERNMENT PLANS DESCRIBED

Duesseldorf HANDELSBLATT in German 24-25 Oct 80 p 17

[Article: "Industrial Robots: Problems With 'Holdover Jobs'"]

[Text] Duesseldorf, 23 Oct--The Augsburg firm Keller & Knappich (Kuka) has signed the largest contract so far for the delivery of industrial robots in the FRG (See HANDELSBLATT 10 August). BMW ordered 125 industrial robots for different operations at a cost of DM 33 million. The contract, which is to be completed by mid-1982, also covers the delivery of 85 so-called gantry robots, which are just leaving the prototype development stage. Kuka unveiled the devices to the press.

This order is only one part of a BMW plan to install about 300 robots in the next one and one-half years for highly diversified operations. The other fortunate contract recipients have not yet been announced, nor has the principal contractor for the project of converting BMW's welding plants.

The gantry robot, type IR 250/500, is designed specially for spot-welding operations in picker and welded cylinder manufacture and replaces conventional multipoint surface tool components on standard welding lines. It is a 5-axis robot which works suspended from a gantry. Depending on its function there is a choice between rotary and translatory drive for axis 1.

The unit can apply a maximum welding force of 500 daN (decanewtons, about 500 kiloponds) to the material, which is supported from below by the copper-plate counterelectrode.

The technology of the IR 250/500 is based to a large extent on the 6-axis standard machine manufactured by Kuka, the IR 601/60, which has also been ordered by BMW: point-to-point control brings up the programmed-in spatial coordinates in the shortest possible time. The control is programmed by the teach-in method.

All five axes are driven by direct current disc armature motors which Kuka buys from Maviliar Iberica in Barcelona. Electric propulsion is preferred to hydraulic drive, although it is more expensive. It is said to be more durable, more reliable and does not cause cleanliness problems because of unnoticed oil

leakage. The motors are protected against overloading by a tooth-belt drive stage and dynamic voltage regulation. All the axes are kept in position at rest by holding brakes.

The accuracy of robots with electric drive is said to be better. For the 1,000 programmable points of the gantry robot consistent accuracy of 1 mm at a 500 kg load and maximum speed (3.6 m/sec) is guaranteed.

Lightweight construction using as much aluminum as possible in housings and transmission elements makes the unit stable in spite of its low weight. What is particularly important with robots: the manufacturer has made an effort to facilitate maintenance and repair. The individual components can be replaced easily and they have good accessibility.

So far the IR 250/500 exists only as a prototype. Four preproduction machines are now being assembled. The gantries, which are not included in the amount of the contract, will also be built by Kuka. The first double gantry has already been welded together.

But without expanding production capacity the big BMW contract cannot be handled. The 30 to 40 men who have been assembling 5 to 7 robots each month until now will be increased by the spring of 1981 at the latest to 60 to 80 men, who will then build 10 to 15 of the steel "coworkers." In this instance jobs are being created by industrial robots.

Under the BMFT [Ministry for Research and Technology] program to promote "the humanization of life in the work place" Kuka will receive DM 5 million for its work in this cooperative venture, which is supervised by the DFVLR [German Aerospace Research and Test Facility]. The money is to go for the development of new mechanical and guidance systems and sensors for robots. The technical side of the project is less difficult than the social challenge of trial installation and the structural change among jobs. The BMFT program calls for the creation of so-called "holdover jobs" with higher qualifications than before the robots were installed.

Large industries are flatly refusing to cooperate. Even industry in the medium size range is scarcely showing much enthusiasm. Some of the causes of this caution regarding the collaboration necessary to introduce the industrial robot smoothly, not only technically but also socially, i.e., with minimal internal friction in the businesses, are: The prescribed sociological research associated with it and the obligatory presence of "outsiders" is scaring the firms' leaders as is the program's plan for the plant workers' council to have a part in the reassignment of jobs.

The problem of "holdover jobs" next to the robot, that is, mostly the utterly boring installation of parts, is only a question of time, according to Kuka, until industrial robots are developed with perfect line control systems and optical sensors to recognize assembly parts. This development would also boost the growth rate of robot installations in the FRG (currently 20 percent or about 500 units annually for 5- and 6-axis machines, with about 1,255 installed altogether, IFR number). Robots could then carry out more manual operations and sort parts.

In Kuka's shops a second welding line for truck rear axles is currently under construction for the Kama works in the USSR. The first welding line delivered by Kuka is already operating successfully. A company spokesman referred to the public discussion going on at the time by saying that as usual in transactions of this kind there was no way to influence what kind of truck axles finally came off the line.

9581
CSO: 3102

INDUSTRIAL ROBOTS TO DOUBLE IN NUMBER THIS YEAR

Munich SUEDDEUTSCHE ZEITUNG in German 31 Oct/1-2 Nov 80 p 33

[Article by Felix Spies: "Advance of the Iron Slaves"]

[Text] Stuttgart 30 Oct--With retooling of the German automobile industry for the production of more energy-efficient vehicles and uptooling to meet the competition from the Far East, industrial robots will be installed in factories in large numbers for the first time.

Programmable manipulating robots work cheaper and better on many jobs in mass production than people. In addition, they make the manufacturing system more flexible compared to the fully-mechanized, moving assembly line. The advance of the robots--most noticeable in the automobile industry but also underway in other industries--brings with it, however, problems: the confrontation between men and machines over jobs is already programmed.

With cool precision they feed red hot work pieces to forge presses in the midst of heat, noise and vibration. In the assembly of auto bodies, they locate 25 times a minute with the adeptness of a sleepwalker even the most difficult welding points. They spray paint with great uniformity on cabinets for household appliances unconstrained by the poisonous fumes of the solvents. Even though they usually operate several shifts a day, they have no requirement for a rest break; they never go on vacation; they get not a penny of wages--industrial robots are not carried on the personnel roster.

Microelectronics Makes It Possible

The new class of workers, controlled by computerized brains and actuated by electric, pneumatic or hydraulic drives, is, to be sure, a small elite band. But their importance for mass production is rapidly increasing because of the improvement in their learning curve induced by progress in microelectronics in recent years. During this year alone almost 500 new robots--at costs between DM 60,000 and 300,000--are being installed in factories in the FRG, primarily in the automobile industry. With this addition, the Institute for Production

Engineering and Automation (IPA) in Stuttgart expects 1,255 manipulating robots to be at work in the FRG by the end of 1980.

The growing esteem for robots by the production chiefs of industry depends on the one hand on wage developments and on the difficulty of finding enough people to fill monotonous and health-endangering jobs. On the other hand, industrial robots--as machines which can be freely programmed about several (up to five or six) axes of motion--offer the potential for replacing in mass production the efficient but inflexible, fully-mechanized assembly line by more flexible assembly systems.

An industrial robot which spot welds automobile bodies--most manipulating robots are presently used in this field--is not only far more efficient than his human counterpart; he can also--in contrast to the assembly lines installed since the 1960's--be made to weld the bodies of different models simply bh changing his program. In the future automobile manufacturers will be compelled to be much more versatile than in the past in their mass production methods owing to rapid changes in the market: consequently, the industrial robot is facing a great future in this particular branch. BMW alone ordered just today 125 additional robots from Keller and Knappich (Kuka) in Augsburg, the foremost welding-robot manufacturer in the FRG.

Also, the auto industry played a prime role in the recent past to manipulating robots. Following the model of American industry which was technologically more advanced, the German automobile companies installed the first robots in the early 1970's, in the beginning mainly for difficult welding work. The largest German manufacturer of personal automobiles, Volkswagen, was itself among the producers of industrial robots and has in the meantime installed between 300 and 400 robots in its own factories. By virtue of this, VW is the leader in Germany; however, the other auto manufacturers are currently close behind and pressing hard.

The programmable manipulating robots will quickly gain a foothold in other industries, primarily in the electrical and machine building branches. In the FRG there are estimatedly about 1,500 companies in which industrial robots could be employed; today about 60 companies are using them. Concerning the effects on jobs, some figures already exist: according to studies conducted by the Batele Institute in Frankfurt, one industrial robot when handling a work piece directly displaces more than six workers; when manipulating a tool, just under two people.

Political Dynamite

One thing appears certain: on their march into the mass production system, the robots will--especially when they are beyond their present state of development and have received efficient sensing and even learning faculties--within a few years reach the political critical point. Already by the second half of this decade, according to the experts, the then even more efficient and probably also less expensive industrial robots will be able to man hundreds of thousands of jobs for which human effort had been indespensible up to that time. The advance of the robots now beginning under the banner "Job Humanization" will in the end become a hot poker between business and labor.

9160
CSO: 3102

NEW PROCESSES, FUTURE OF SPECIAL STEELS INDUSTRY REVIEWED

Paris INDUSTRIES ET TECHNIQUES in French 9 Sep 80 pp 21-27

[Article by Alain Perez: "Swedish Steel: Plasma by 1981"]

[Excerpts] At a time when all attention is focused on reducing steel production, Sweden is a striking case. Even though it ranks but 26th among the world's steel-producing countries, Sweden has gained a select position for itself in the field of special (or fine) steels. Its steelmakers are now innovating and planning to apply plasma torch technology to the direct reduction of iron ore and the production of raw steel.

Like most industrial countries, except Japan, Sweden has been hard hit by the steel crisis. From 1974 to 1979, its steel work force declined from 51,000 to 47,000, mergers and agreements between producers substantially increased, and a new semination alized industrial group was formed. In Sweden, as elsewhere, the entire iron and steel industry finds itself with surplus plants and equipment in 1980, namely a total installed capacity of 7.4 million tons. As a result, direct government intervention has been required on several occasions to prevent the ordinary-steels sector from collapsing.

The country's leading steel company is SSAB (Svensk Stal AB), the new industrial group formed in 1978 by integrating the three steel plants in Lulea, Oxelesund, and Domnarvet owned by the following previously rival producers: Granges AB, Norborttens Jarnverk AB and Stora Kopparberg Berglag AB. This mixed-economy company--the state owns a 50-percent interest--specializes in ordinary steels. SSAB's first year of existence was a difficult one and the company posted an operating loss of 669 million kroner (same amount in French francs).

S&AB's 1979 output stood at 2.2 million tons of raw steel--Usinor [France]: 9.4 million tons--for an approximate installed capacity of about 4 million tons. The company continues to show an overall deficit and survives only with the help of government subsidies. A reconstruction loan of 1.8 billion kroner was granted the new firm at the outset and later a second loan of 1.3 billion was added to expedite modernization of existing plants.

In the next 10 years, the modern Oxelesund and Lulea plants are to have their continuous casting capacity increased and their productivity enhanced. The older Domnarvet plant is going to specialise in the production of electric steel at a rate of 400,000 tons per year. The two obsolete Kaldo 100-ton blast

furnaces are scheduled to be permanently shut down in 19?1, and it is planned to increase rolled-steel capacities. The bulk of such steel is currently imported. Eventually, this plant will become the center for flat products coated with an alloy of aluminum (55 percent) and zinc (45 percent) by means of the American Galvalume process.

There have also been a few noteworthy mergers in the special-steel sector, including the agreement signed between Uddeholm, Granges and Sandvik in May 1979. This Uddeholm-Granges and Uddeholm-Sandvik cooperation agreement rationalizes outputs and investments, thereby avoiding duplication.

Uddeholm, the prime contractor in these agreements, has entered into partnership with Granges by establishing a joint company specializing in stainless steels.

The partnership between Uddeholm and Sandvik is for the production of cold-rolled steel strips. As for SKF Steel, the latest major producer of special steels, it has remained aloof from any agreements, convinced that it can go it alone.

'Clean' Steels and New Processes

With an installed capacity of some 700,000 tons per year, SKF Steel appears to be the leading Scandinavian producer of special or fine-grade steel. It has 6,000 employees and three plants in Sweden (Hofors, Hallefors and Bangbro) plus one plant in the FRG (Augsburg). Its volume of business in 1979 totaled 1.8 billion kroner, 1.3 billion of which was from exports.

Initially, SKF was the parent company's exclusive supplier of steel for bearings. Little by little, it has diversified and is now active in three fields: steel for bearings which is still its main activity, the automobile industry, and transmissions. Its research center in Utrecht, The Netherlands, is primarily engaged in developing "clean" kinds of steel and new metallurgical processes.

These past few years, the following processes have been developed: the MR (Melting Refining) process in which melting takes place inside a twin furnace and refining inside a ladle in two separate stages; the ESR (Electroslag Remelting) process adapted to the making of spring steel; and the SR (Smelting and Refining) process whose development was begun in the early 1970's; and also a method for the direct reduction of iron ore by using hydrogen, a method eventually abandoned as uneconomical. This method produces spongy iron of a high degree of purity and could be revived if an economical method of making hydrogen is ever developed.

Apart from its research program, SKF Steel initiated a plan in the early 1960's for the modernization of its obsolescent Hofors and Hallefors plants. At that time, the steel industry was booming and more than 200 million kroner were invested in these two plants which date back to the Middle Ages (Hallefors' first furnace was put into operation in 1631). This modernization program was completed in 1977, but the steel crisis was then at its height and the country's production of special steels had touched bottom and stood at barely 1.159 million tons compared with 1.532 million tons during the record year of 1974.

The company found itself with a new steel plant in Hofors designed to produce 300,000 tons per year with the MR process, and also a brand new rolling mill in Hallefors. This planetary type, three-high rolling mill mounted on a rotary head reduces the cross-sectional area of billets 50 percent in a single finishing cut. Scandinavia's biggest rolling mill thus became operational at a time when the European iron and steel industry as a whole was thinking only of reducing its number of employees and regaining the competitive edge it had lost.

The Hofors steel plant contains a dual three-electrode furnace which produces 80 tons of molten steel in 2 hours. Refining is done in an ASEA-SKF furnace. The molten steel is then cast--by bottom casting--into 24 ingots, each weighing slightly more than 3 tons.

Plasma-Produced Steel

The Hofors steel mill also participated in the development of two new metallurgical processes called Plasmamelt and Plasmared. These processes apply plasma technology to iron and steel production. Both are still in the pilot plant stage and efforts are being made to obtain complete financing. These innovative processes are based on a series of technical and economic arguments and on an analysis of the production cycle most commonly employed at the present time. Officials of this project have calculated the basic capital investment for a traditional iron and steel production complex--coke oven, agglomerating plant and blast furnace--to be $360 per ton of metal produced per year. To be profitable, today such a complex must have a minimum capacity of 2 million tons, thereby requiring an initial capital outlay of $720 million.

Between 1960 and 1980 the diameter of newly built blast furnaces was doubled. This race to build giant facilities has two negative consequences. Blast furnaces have become less and less flexible and are ill-adapted to the needs of new countries. Furthermore, their construction time often makes them obsolete by the time they are put into commercial operation.

In addition, a facility of this type has the disadvantage of being almost totally dependent on metallurgical coke and agglomerates of raw materials which cannot easily be economically improved. Moreover, the gigantic dimensions of such a facility increase and complicate environmental problems.

The first potential application of plasma technology is in obtaining raw steel. SKF Steel claims that in doing this its Plasmamelt process can reduce production costs 20 percent, can permit use of such alternate energy sources as coal, oil, or gas, and can lower total energy consumption by one-third. Furthermore, in this process where the coke oven and agglomerating plant are no longer necessary, plant construction costs are reduced 20 percent and all forms of energy can be used.

This process requires a 60-percent prereduction of iron-ore concentrate in two standard fluid beds at 800°C. The concentrate is then injected into the reduction zone along with powdered coal or oil. Simultaneously, a plasma

generator at a temperature of between 3,000°C and 5,000°C supplies further power for the final melting-reduction operation. The residual gas--a mixture of carbon monoxide and hydrogen--is reintroduced, after scrubbing, during the prereduction stage.

A blast furnace equipped with a plasma torch is said to be economically viable wherever annual production is at least 250,000 tons. Preliminary tests with a 0.5-megawatt plasma torch were conducted in 1979 and are now being continued with a 1.5-megawatt torch. In its commercial version, the plasma generator will supply 15 megawatts of power to a blast furnace with an annual production capacity of 60,000 tons. This full-scale test could begin in 1983 provided the Swedish Government grants the requested subsidy of 90 million kroner.

Direct Reduction: 30 to 40 Million Tons by 1985

The second potential application of plasma technology is in the direct reduction of iron ore. Swedish experts consider the ore-spongy iron process to be better adapted to developments in the scrap iron and steel market. This scrap is the basic raw material used in making steel in electric furnaces and is becoming scarcer and scarcer. Furthermore, it is contaminated by impurities--copper especially--that are detrimental to the production of high-grade steel. This contamination of scrap metals makes them practically unfit for use in producing special steels.

According to some Scandinavian estimates, direct reduction, currently at some 12 million tons per year, could increase to 30-40 million tons per year by 1985.

Swedish iron ore has a low silica content of 0.8 percent and a high iron content of more than 70 percent. It is, therefore, highly suitable for use in direct reduction.

Direct reduction consists of those iron-ore reduction processes that produce a metalized compound or spongy iron. This method has always interested iron and steel metallurgists. It remains marginal, however, because of its production costs.

Today's most well-known processes--Midrex and Hyl--are employed primarily in countries that are becoming industrialized and have access to cheap gas, and particularly in South America and the Middle East.

This process also requires ore with a high iron content and fine granulation, and containing little or no volatile substances or impurities. These requirements practically bar the use of certain ores and favor those contained in the rich Australian and South American deposits.

Here again, the use of a plasma torch is considered to be the solution to the problem of expensive energy. A pilot facility is now being installed.... The Hofors spongy-iron plant, built in 1955 but shut down in 1978 for economic reasons, is being refitted and is expected to resume its initial activity in 1981. Capital investment required for this project totals 25 million kroner.

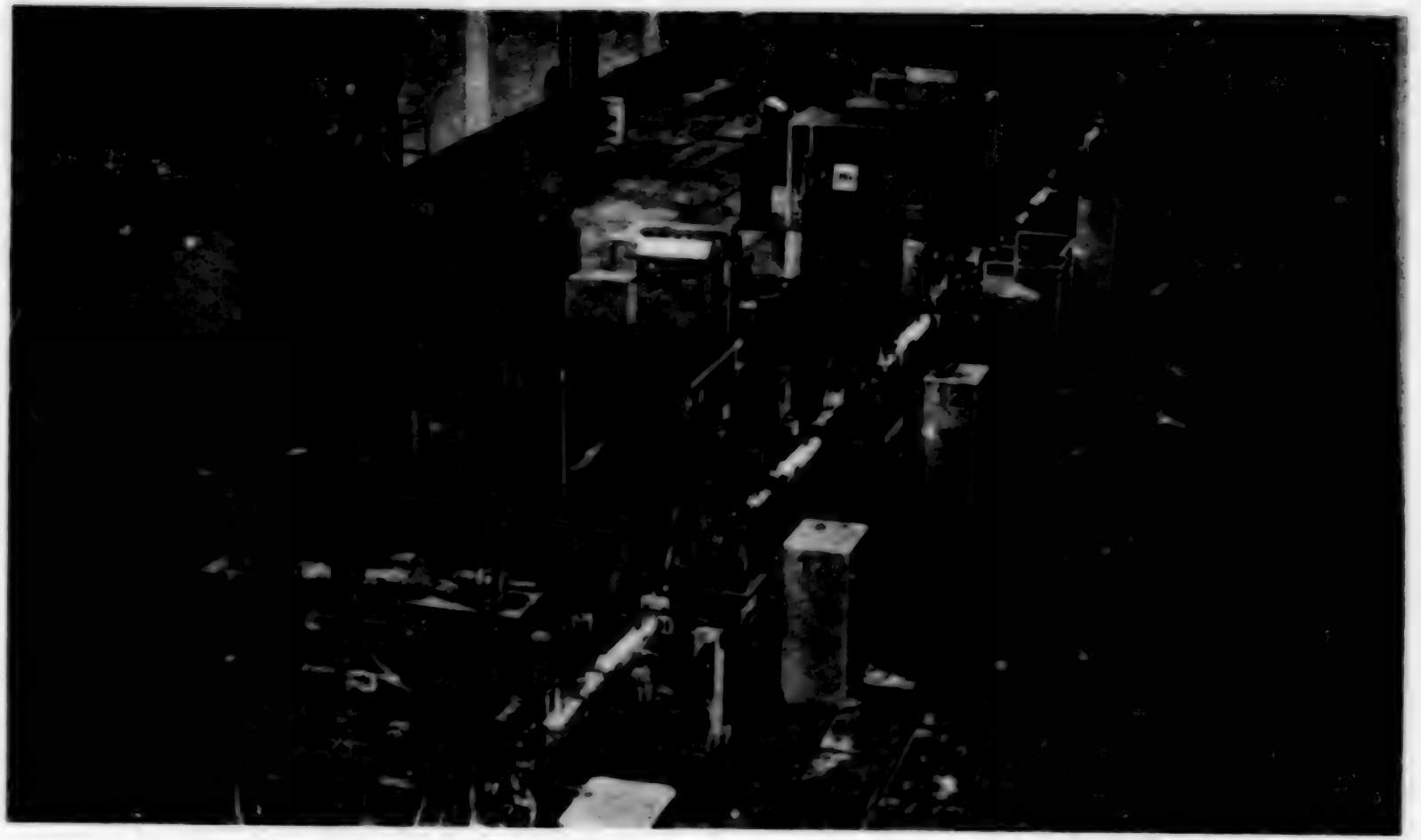
This large-scale operation--70,000 tons of spongy iron per year--will be the first commercial application of the plasma torch in the iron and steel industry. In the longer run, the combining of these two processes could constitute the prototypes of tomorrow's steel plant.

For the present, this technique remains a Swedish speciality. A few tests were conducted in Europe by the ECSC (European Coal and Steel Community), but with no follow-up action. The Japanese seem to be modestly interested in the technique.

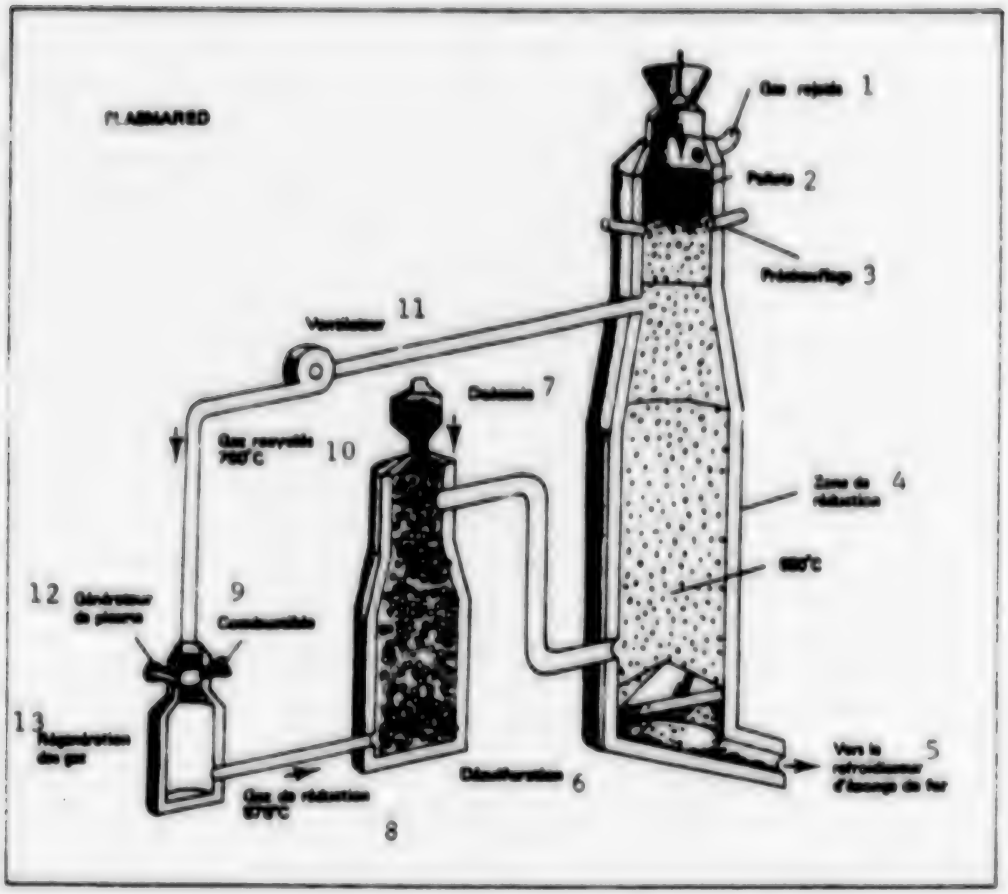
Despite these innovations and an age-old tradition, the Swedish iron and steel industry does, nevertheless, appear to be vulnerable. Isolated and fragmented, Scandinavian steel companies are at the mercy of those regulations and restrictions on imports which this or that country may decide to impose.

The American market is the leading consumer of Swedish special steels. In 1978, it purchased 600 million kroner worth of tubes and stainless steel. The Americans, however, are periodically threatening to close this market, at least partly.

Ordinary steels continue to be in a crisis situation. And in this particular field, Sweden with its high wages--in 1978, Swedish steelworkers were the highest paid in Europe--has to cope, like many others, with competition from steel's newcomers.



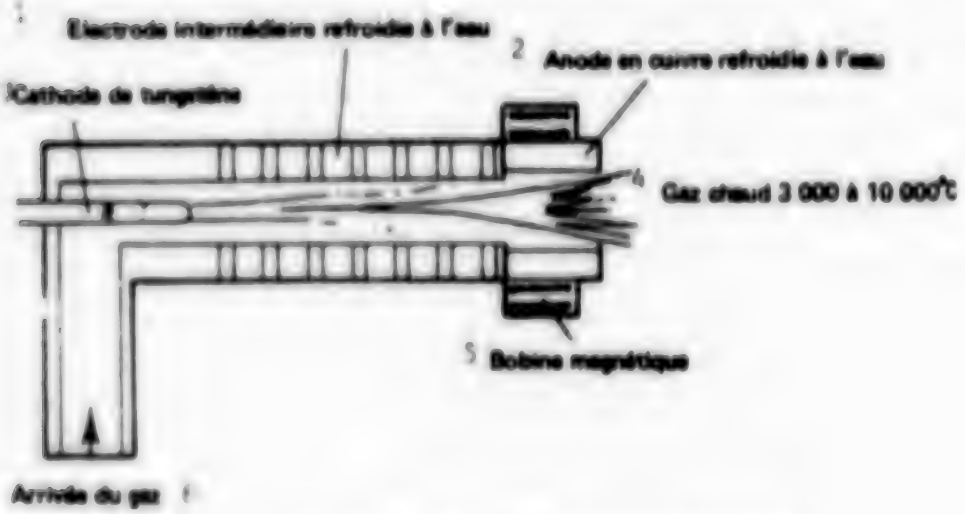
The fully automatic bar mill in Hallefors. It went into operation in 1977.



The Plasmared process is one of the principal applications of plasma technology to the direct reduction of iron ore

Key:

1. Exhausted gases
2. Pellets
3. Preheating
4. Reduction zone
5. To sponge-iron cooling unit
6. Desulfurization
7. Dolomite
8. Gas reduction 875°C
9. Fuel
10. Recycled gases 700°C
11. Blower
12. Plasma generator
13. Regeneration of gases



PRINCIPE DE GENERATEUR A PLASMA PAR COURANT DIRECT

Principle of Direct-Flow Plasma Generator

Key:
1. Water-cooled intermediate electrode
2. Water-cooled copper anode
3. Tungsten cathode
4. Gas heated 3,000°-10,000°C
5. Magnetic coil
6. Gas intake

Up to 10,000°C

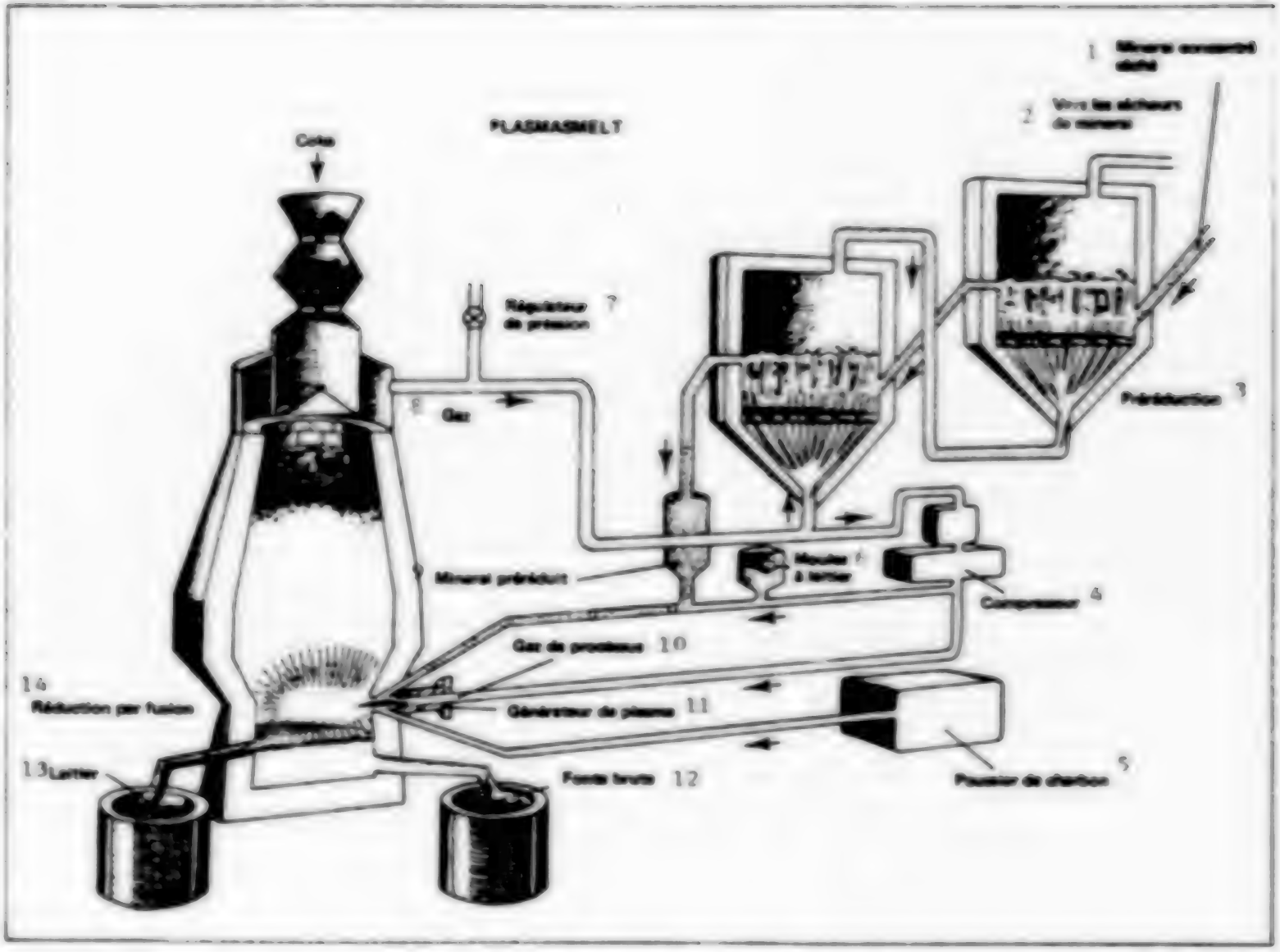
In 1981, the Plasmared process will become the first commercial application of plasma technology to the iron and steel industry. A plasma, the fourth state of matter, is made by heating a gas at temperatures in excess of 2,000°C and thereby dissociating the molecules of that gas. When the temperature reaches 3,500°C, the free atoms in turn are stripped of all or part of the electrons surrounding their nuclei, thus upsetting each atom's equilibrium. The ionized gas then becomes a plasma and possesses special characteristics of viscosity and electric conductivity.

The most frequently used direct-flow plasma generator consists of a tungsten cathode and a water-cooled copper anode. Such a generator has an efficiency of more than 90 percent and the useful life of its electrodes is about 1,000 hours. This system's physical properties make it possible to obtain high energy densities and temperatures of up to 10,000°C independently of the medium's oxygen potential.

Special Steels Steadily Increase Their Share of Swedish Steel Output
(Mt = millions of tons)

	1960		1970		1973		1977		1978	
	Mt	% of total	Mt	% of total	Mt	% of total	Mt	% of total	Mt	% of total
EEC (7 countries)	6.85	7.0	14.35	10.0	15.85	10.6	18.20	14.4	21.11	15.9
Benelux	0.19	1.4	0.42	1.8	0.54	2.0	0.52	2.5	0.77	3.4
France	1.47	8.5	3.02	12.7	3.28	13.0	3.41	15.3	3.56	15.6
Italy	1.37	16.1	2.64	15.3	2.78	13.2	4.77	20.4	5.09	20.9
FRG	2.17	6.4	6.11	13.6	7.03	14.2	7.09	18.2	8.14	19.7
UK	1.65	6.7	2.16	7.6	2.22	8.3	2.41	9.9	2.55	12.6
Sweden	0.71	21.9	1.32	24.9	1.40	24.7	1.06	26.2	E 1.20	E 27.90
United States	7.62	8.5	12.73	10.7	16.22	11.6	15.12	13.0	E15.70	12.70
Japan	1.87	8.4	11.81	12.7	14.66	12.3	15.28	14.9	17.00	16.95

Source: DAFSA [Documentation and Financial Analysis Company, Paris]



The Plasmamelt process can cut raw-steel production costs 20 percent and does not require costly construction of a coke oven and agglomerating plant.

[Key on following page]

Key:

1. Dried ore concentrate
2. To ore dryers
3. Prereduction
4. Compressor
5. Powdered coal
6. Slag molds
7. Pressure regulator
8. Gas
9. Prereduced ore
10. Processed gas
11. Plasma generator
12. Molten pig iron
13. Slag
14. Reduction by smelting

8041
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RHONE-POULENC ENTERING GENETIC ENGINEERING FIELD

Paris LE NOUVEL ECONOMISTE in French 13 Oct 80 p 80

[Article by Gilles Coville]

[Text] Private industry is attracting brilliant geneticists. On 3 November, the first researchers recruited by Genetica -- a company formed by Rhone-Poulenc, specializing in genetic engineering research -- will go to work in laboratories at Joinville specially reequipped for their use. Leading them will be Alain Rambach, former employee of the Institut Pasteur and one of the rare French specialists in the techniques of gene recombination, on which the hopes of industrial biology are founded.

Already, two people in this very touchy area of biological research, Pierre Chambon and Philippe Kourilsky, participated several months ago in the formation of the company Transgene, a project directed by Paribas, with which various manufacturers and public research organizations are affiliated.

But, this time the plan is different. Pierre Chambon and Philippe Kourilsky will simultaneously conduct their work as "public researchers" (at the University of Strasbourg and the Institut Pasteur) and be responsible for the scientific inspiration of Transgene. As for Alain Rambach, he has chosen to resign from the Institut Pasteur to devote himself entirely to Genetica, in which he will hold a "significant number of shares."

The Hunt

As for what Genetica will be and what it will do, the management at Rhone-Poulenc remains very discreet at present. "We want to build up a core, including several dozen high level specialists, oriented exclusively towards research," says Mr Igor Landau, head of the medical division of the chemical group. The formation of such a core alone raises numerous problems. The top specialists are as rare as they are in demand. Genetica is seeking these rare birds not only in France, but also in Germany, Great Britain, and the United States. A search which will be very decisive for its future. "We have filled pages and pages with possible subjects for research," explains Mr Michel Lavalou, director of research and development at Rhone-Poulenc. "But, we have not actually drafted a firm program for Genetica. It will depend on the specializations of the men who join us."

9693
CSO: 3102

PRODUCTION WITH LIMITED MANPOWER SEEN AS WAVE OF FUTURE

New Concept

Stockholm NY TEKNIK in Swedish 11 Sep 80 p 44

[Text] Japan is building an unmanned factory. It will cost 250 million kronor and will be producing gearboxes.

The production will be taking place by means of robots and computers. Ten people will be seeing to it that everything functions well.

The Japanese factory will be producing as much as a conventional factory with 700 employees.

It will be ready for production in 1984. The year for which the author George Orwell predicted the controlled society where the Big Brother sees everything.

But the Japanese factory is not typical. It is the most spectacular experiment in the new wave of automation and robotization.

Production with limited manpower, on the other hand, is a reality. Production with limited manpower is one of the big ventures of the engineering industry in the eighties.

This is the way a factory with production with limited manpower may work:

Automatic Transfer

The products are transferred automatically from one machine to the other. Robots or trucks without drivers move the products. The machines are provided with automatic devices which handle the products.

Computers control the production.

The automatic flow has the effect that the production can take place all the 24 hours.

During the day there are people in the factory. They look after the machinery, fill the machines with raw materials and handle the finished products.

During the night the machines operate without supervision or with just a few people in the factory.

Production with limited manpower means drastic rationalization but not to the extent of the fully automated factory.

Production with limited manpower is a combination of new techniques within the areas of robots, computers and materials handling. Production with limited manpower, moreover, is based on new ways of organizing the production--the so-called products workshops or flow groups.

Twenty Researchers

Production with limited manpower is the new production technology, a new 'philosophy' in industry.

Sweden has since a few years had a special research project which collects and develops the production with limited manpower technology. The state and the industries are funding it. Twenty researchers are involved.

The Swedish production with limited manpower project was started in the mid-sixties. Curt Nicolin had taken the matter up in the Swedish Society of Industrial Engineering. The background was that wages were rising more rapidly than the costs of the machinery, that the investments in the machinery nevertheless had become so expensive that the machinery would have to be utilized all the 24 hours, and that it was difficult to get people to work in shifts.

In 1976, the term production with limited manpower was invented by an engineer at ASEA [the Swedish General Electric Company]. The project was started later on.

The unmanned night shift is already a reality at several Swedish places of work.

The industries have from the very beginning been very interested in production with limited manpower. Thousands of reports on investments in production with limited manpower are, at present, being prepared in Swedish engineering industries.

Production with limited manpower implies far-reaching rationalization. The Swedish experience seems to indicate that the manpower need will be reduced by 50-75 percent.

The use of the machinery may be more effective. Production with limited manpower may imply that the machinery is in operation twice as long as in the case of the usual two shift operation.

Flexible Production

Production becomes more flexible. In times of recession, the factories operate with two shifts. In times of prosperity, a third unmanned shift is added.

Production with limited manpower may become a big controversial issue in the Swedish labor market.

How many jobs will disappear? Which jobs will remain?

The Swedish Metal Workers' Union has been opposing the production with limited manpower project. It considers the project to be far too much geared to technology, with only marginal regard for human needs.

The industries often state that it will be the dirty and monotonous jobs which will be disappearing. But several investigations seem to indicate that it will instead be the occupational experience which will no longer be in demand after such rationalization measures.

Trying Psychological Environment

And even if occupational experience will still be needed, man is often reduced to being a supervisor who is expected to intervene only if something goes wrong. This means a nice physical work environment but one which is trying phychologically.

Project Organization

Stockholm NY TEKNIK in Swedish 11 Sep 80 p 44

[Text] The Swedish production with limited manpower project has been operating for 4 years. So far it has cost 4 million kronor.

During the next 5-year period, it will be expanded for another 10 million kronor.

The National Swedish Board for Technical Development and the Swedish Association of Metalworking Industries are paying approximately half each.

The practical work is done primarily by the Institute for Engineering Research and the technical universities at Linkoping and Stockholm.

Seventy representatives of commerce and industry are forming supporting committees for the project.

The production with limited manpower project has been divided into 16 subprojects which deal with different technical problems, for example processing, supervision and control, handling and storage as well as operation and administration.

Automated Shop

Stockholm NY TEKNIK in Swedish 11 Sep 80 p 42

[Article by Lennart Bernhardtson]

[Text] One of the big ventures of the engineering industry of the eighties is called production with limited manpower.

Production with limited manpower is a new production technology, a new 'philosophy' within the industries.

The machinery operates all the 24 hours, the personnel works during the daytime with maintenance and service.

The aids are robots, computers, materials handling techniques, and a new form of organization.

When the clock strikes 12 midnight, the night shift is over at BT, Building and Transport Economy Inc. at Mjolby. The lights are switched off, and everybody goes home.

However, one machine continues working all night. Without supervision by humans.

Close to the machine is a crane, without a driver, which, like a ghost, runs back and forth, providing the machine with work. This is production with limited manpower. Building and Transport Economy Inc. has got farthest in that area in Sweden.

"Perhaps we have got farthest in the world when it comes to the practical application," says a researcher in the area. Building and Transport Economy Inc. is part of the industrial sector of the Swedish Cooperative Union and Wholesale Society. The enterprise has 2,700 employees, 1,000 of whom are in the Mjolby factory. The annual turnover amounts to 350 million kronor.

Solitary Japanese

The enterprise makes pallet hoists, trucks, motorized lift trucks, stacking devices and other means of transport for materials handling.

So far, only one machine works the unmanned night shift. It is a so-called multioperation machine of the Japanese Yasda brand from Yasuda Industry. It drills, bores and mills and has a store of 70 exchangeable tools.

Details to be worked are fitted in holders called palettes. This is done manually. With ten palettes full, the machine has got work for an entire shift. The palettes are exchanged by the crane without a driver, which is BT's own design.

The machine and the crane are attached to a computer system. The computers control the exchange of tools and the exchange of palettes. If something goes wrong, for example, if a tool breaks, the sensors of the machine react and alert the computers.

The computers respond by ordering an exchange of tools.

Bo Stromgren, en engineer with BT, has developed the production with limited manpower system. According to him, it works very well.

"The only problem has been the night shift who have been trying to shut off the machine a few times."

At present, BT plans to expand to machines with operation all round the clock.

Wide Tolerances

The production with limited manpower technology involves technical problems which have not yet been solved. The tool storage capacity is limited, for which reason only tools of the same hard metal quality are used. That means that the number of details which the machine can handle is limited.

The details have to involve a short cutting operation and allow for quite wide tolerances.

Another problem is the storage of palettes. At BT, the problem has been solved through vertical storage and handling with BT's own crane.

Despite these problems, the production with limited manpower in the case of BT is very profitable.

The degree of utilization of the machines increases by approximately 2,000 hours per year. As far as the capacity is concerned, this means that a multioperation machine in production with limited manpower operation replaces two older machines which, together, cost 3.5 million kronor. A production with limited manpower machine with handling gear is 500,000 kronor cheaper.

But, in addition, BT saves the costs of 3 operators. Conventional machines would require 5 operators, the production with limited manpower machine only two.

Also the inventory costs become lower as a result of the reduced throughput time.

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BRIEFS

EXPANDING ROLE FOR COMES--Paris--New Statutes of the French Commissariat for Solar Energy: "Last Wednesday, the Council of Ministers adopted a draft decree modifying the statues of the Commissariat for Solar Energy, in order to establish the position of director general and two specialized committees, one for the promotion of solar energy in the home and the other for energy uses of the biomass." "This strengthening of the structures," the communique states, "will permit the Commissariat to face up to the broadening of its missions and the continual growth of its tasks." [Text] [Paris AFP SCIENCES in French 18 Sep 80 p 11] 8143

CSO: 3.02

FUTURE TRENDS IN AUTO INDUSTRY DISCUSSED

Bonn DIE WELT in German 25 Oct 80 p 4

[Article: "Head of ADAC Presents 'Auto 2000'"]

> [Text] The chairman of the Berlin ADAC [Allgemeine Deutsche Automobil Club], lawyer Wolf Wegener, gave warning of the approaching storm in the German automobile industry at a meeting of the Association of Berlin Merchants and Industrialists. By the year 2000 probably every second citizen of the FRG will own a car. The only question is: German or Japanese? Wegener challenged the German automobile industry to treat the driver as a mature consumer and to develop some creativity.

In 20 years the purchase price of a passenger car in the lower middle class will have risen to between DM 35,000 and DM 38,000, a liter of gas will cost about DM 2.20. But the family car will take only about 8 percent of the monthly household budget and not, as it did this year, 12.6 percent.

Based on this maximum calculation in a lecture given to the Association of Berlin Merchants and Industrialists on the topic "Auto 2000" the chairman of the Berlin ADAC, Wolf Wegener, ventured the prognosis that driving a car in the year 2000 will almost certainly not be more of a burden on the pocketbook than today. "Keeping a car will be more inexpensive rather than more costly." The car on the threshold of the new century will be equipped with mini-computers and microprocessors. Wegener expects them not only to take driving easier but, primarily, to control the consumption of energy. There will be two basic types of car:

--The durable, slower urban car with a fuel-saving diesel engine; the bodywork will be built without any design extravagancies or costly effort to achieve aerodynamic design, which will be noticeably cost-effective for manufacture and repair.

--The higher-horsepower long-distance car will be constructed with an eye to economical use of energy. This means reducing drag resistance and fuel consumption with streamlined bodywork, lighter materials and improved construction techniques. Wegener expects the four-cycle internal combustion engine to have a higher compression ratio and burn only premium gasoline.

Compared with 23 million cars in the FRG today, the head of the Berlin ADAC calculates that there will be about 28.2 million by the year 2000. Even in the event of a "disharmonious" development about 26.1 million is seen as a realistic figure by the turn of the century. This means that in 20 years practically every second citizen of the FRG might own a car.

Wegener warns against dramatizing the danger threatening the German automobile industry from Far Eastern competition. It was true that the Japanese had acquired a market share of about 10 percent in the FRG and of more than 16 percent in Berlin, although Berlin represented an exception. But it could not be overlooked that the growing Japanese share of the market came in large measure at the expense of the European importers.

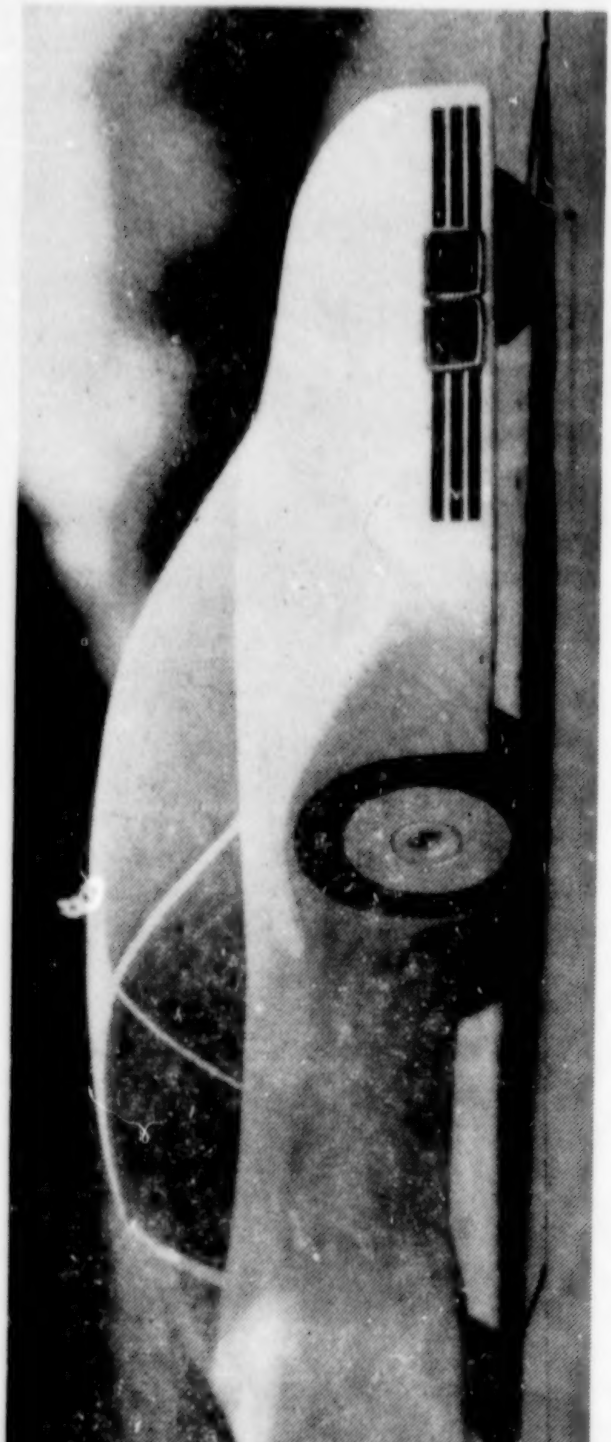
Wegener was against trade restrictions or other control measures. "In order to survive here, we need better products."

"Has the car buyer been treated in recent years as seriously as he deserves, as a mature consumer?"

"Have there not always been attempts to force products on him that he did not necessarily have in mind?"

What problems there were, said Wegener, just in getting the extras that the driver needs and really wants. Is sales policy in Germany really oriented to the customers' wishes? The Japanese simply spent more time and money in order to find out what the customers need. Wegener believed that this was why they were successful.

The ADAC chairman stressed the positive development of the German automobile industry in Berlin. Berlin is not only an interesting sales market for vehicles, but a city that in many areas lives from the automobile industry and produces for it. Ten thousand employees in 60 West Berlin firms can be counted as belonging to the automobile industry or the automobile. Daimler-Benz, which has 4,100 workers on the Spree--Berlin's eighth largest employer--is planning medium-range investments of DM 150 million. The company will spend DM 12 million on an unparalleled specialized simulator, which promises to become a bright spot for the research city of Berlin.



This is how designers at BMW see the car of the future: an automobile with an extremely aerodynamic shape. The low body has good airflow characteristics and causes less resistance to the air. It also reduces fuel consumption.

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Dec 15 1980